

as that which passed swiftly across our islands during the night of the 19th to 20th, and had its centre off Yarmouth at 8 a.m. on the 20th, having travelled about 2600 miles in four days and four hours, or at the rate of twenty-six miles an hour. This rate is somewhat high for an average extending over so long a period, but it is in accordance with former experience for an isolated storm-centre, and is fully supported by the high rate of progress the storm had when traversing England. The barometrical gradients in the rear of this storm were very steep, and the difference of pressure was accompanied by a heavy gale on the 20th over the whole of the southern portion of our islands.

We are glad to see that the Meteorological Council are taking steps to ascertain the atmospheric changes which are going on over the Atlantic, since the weather of that ocean has such an important bearing upon that of the British Islands. It is now no longer a matter of speculation as to where the weather comes from which strikes our coasts, but the synchronous charts which have been prepared by the Meteorological Office, both under Admiral FitzRoy and the subsequent governing body, as well as by Leverrier, Hoffmeyer, Neumayer, and the Signal Service of the United States, amply prove that in the north temperate zone of the Atlantic, at least, there is a regular movement of the weather-systems from west to east, or, more strictly, from some point between west and south-west towards east and north-east. These weather-systems not only embrace storm areas, but, to a very large extent, all the ordinary weather changes. It is our intention here, however, to limit our remarks to the question of storms and unsettled weather, as not only being of primary importance, but the conditions with such weather will, although of a more pronounced type, illustrate in a very great measure almost all other meteorological changes.

Probably the enterprising proprietors of the *New York Herald* have done more of late years than all other authorities put together to popularise the fact that our weather changes traverse the Atlantic, but the notion, if nothing more, of the easterly translation was in existence 180 years ago, for Daniel De Foe, in his discussion of the great storm of 1703, inclines to the opinion that it came from America, since, as he says, "they felt upon that coast an unusual tempest a few days before the fatal 27th of November."

The United States Signal Service has for several years past published monthly track charts of all storm-centres in the North Atlantic, and the most cursory examination of these is sufficient to prove that very valuable information might be transmitted to Europe from America with respect to the weather experienced by trans-Atlantic steamers on their outward passage. Prof. Loomis, who has devoted considerable attention to the tracks of Atlantic storms, has calculated the average velocity of storm-centres in the Atlantic Ocean to be fourteen miles an hour, and has shown the rate of progress to be less over the sea than over either America or Europe. Some other authorities have given rather a higher rate of progress than Prof. Loomis, but when a large number of instances is taken it will not be found that the average rate exceeds twenty miles an hour, and probably this rate is the safest that our present knowledge of the subject will allow. The charts of the United States Signal Service for 1879, which exhibit the tracks of ninety-two distinct storm-centres in the Atlantic, show the average rate of progress of all these storms to be eighteen miles an hour. From this it will be seen that, with the speed now attained by many of our principal steam-vessels engaged in the trans-Atlantic trade, if a storm is met anywhere to the westward of the mid-Atlantic, a vessel can, on arrival at a port in the United States, transmit timely notice to Europe that a storm has been experienced, and such notice will serve as a caution to our home authorities to

be on the alert for any evidence of our outlying stations indicating the approach of the storm until its subsequent arrival, or until ultimate proof is obtained that it will not strike our shores. The fact that a storm is blowing out in the Atlantic will also probably be valued by commanders of vessels who are leaving port bound westwards.

The Atlantic gales differ so materially from each other in their character that any information which will convey the nature of an impending storm, either to vessels outward bound or to those engaged on our coasts, will be of the highest importance. It sometimes happens that the whole of the northern part of the Atlantic is taken up with one vast disturbance, the wind blowing with the force of a gale over an area having a diameter of upwards of 1500 miles, and occasionally extending from the coast of America to Europe. On the other hand, several disturbances may exist at one time between the two continents, and in this case a vessel is no sooner out of one storm than she enters the margin of another, and these conditions may last throughout her passage. This will be readily seen from the synchronous weather work already referred to; and, if further proof is wanted, it is to be found in the frequency with which storm-centres pass either over our islands or in their immediate vicinity, and in sufficient proximity to influence our winds and weather, if not near enough to give gale force to the wind.

The British Islands are probably less favourably situated for the successful issuing of storm warnings to our coasts than any other country, since they are in the direct path of the Atlantic storms, and they have not the advantage of any stations within reasonable distance to the westward beyond their limits by which they may be warned, so that it often happens that a storm is almost upon us before its approach is foreseen. An attempt was made some years ago to moor a vessel at the entrance to the English Channel and to connect it by a telegraph cable with our coast, but the attempt was a failure, and experience has shown that the step now taken by the Meteorological Office to obtain Atlantic weather information is the only one which promises success.

THE ACTINÆ¹

THIS is a work which contains far more than it promises. Though commenced with the intention of describing only the Actinians (sea-anemones) of the Bay of Naples, it has extended until it includes all the species known; and although at first sight it seems nothing more than an ordinary systematist's manual—a dry dictionary for the specialist—it turns out on closer examination to have a clearly-marked individuality of its own. In its preface the author remarks, with a tinge of dry humour which here and there ripples the clear precision of his style, that in these days of papers full of histological detail, or rich with plates of caryolitic figures, embryological sections, or genealogical trees, his big book, apparently so purely systematic, may at first excite among his scientific brethren a smile of compassion, if not indeed a word of contempt. Far, however, from renouncing his intellectual birthright of wider scientific aims, he claims with justifiable pride to have produced (and at a self-denying outlay of time and toil not excelled by that of any histological investigation) no mere arid catalogue of genera and species, but a summary of the whole past of actinology, and a new starting-point for the future. He promises, too, a second volume, in which the anatomy, histology, and development, the physiology, distribution, and phylogeny, will be discussed, and no doubt as exhaustively.

The bibliography alone is well worth notice, for its scholarly precision and thoroughness furnish a royal road

¹ "Fauna und Flora des Golfs von Neapel. Le Attinie." Monografia del Dr. Angelo Andres. Vol. I. Bibliografia, Introduzione, e Specigrafia. (Leipzig: Wilhelm Engelmann, 1884.)

to their next investigator, for whose benefit also the most elaborate system of general and special indexes is provided. The history of actinological progress is critically exposed, and even the humblest species-maker scrupulously receives his tiny share of immortality, while the veriest trifles of etymology, popular nomenclature, or culinary use, are not forgotten.

Far more important, however, is the clear schematic account of actinian anatomy, with a recast morphological nomenclature, and thereupon follows the plan of the monograph, where our author briefly outlines the general view of biology and of the relations of its sub-sciences which dominate the work. This agrees largely with that usually adopted in this country (cf. Prof. Huxley's article, "Biology," in the "Encyclopaedia Britannica"), but differs from it in some important respects, notably in the separation of taxonomy into *Specigrafia* and *Sistematica*. Next follows a keen re-discussion of the conception of *species*, and the limits of *genus* and *variety*. The last he proposes admitting as a rule, and then by giving variety an analytic and genus a synthetic aim, and making both changeable as systematists find expedient, he hopes to keep the conception of species near a more constant average. After some useful remarks on nomenclature, the systematic detail is entered upon, and the known species (520 or more), with their endless varieties, described with exquisite minuteness. Numerous diagrams aid the work of identification, and the volume concludes with thirteen magnificent plates, which reflect the greatest credit alike upon the author's pencil and the care of his lithographers, Messrs. Werner and Winter. The classification differs so much from existing ones as almost to be new. Two new families, *Edwardsinæ* and *Stichodactylinæ*, are created; the *Ilyanthidae* are almost abolished, the *Minyadinae* wholly so.

If space permitted, one or two trifling criticisms might be offered, if only to accent the general praise; yet it is better to welcome the book unreservedly as a new sign of the scientific *renaissance* of Italy, and its author as henceforth one of its leaders, who has learned philosophic breadth from the "Origin of Species" without losing the detailed accuracy of the "Monograph of the Cirripedia."

A word finally as to the splendid series of monographs to which this belongs, and which, together with the *Challenger* volumes, mark an epoch in biology. Is it not lamentable that such works—which, if not yet indeed, in time-honoured phrase, "books which no gentleman's library should be without," are certainly needed in every public library, and which even no local natural history society can afford to be without—should be limited to an impression of, after all, only a few hundred copies by the apathy or ignorance of the scientific public? P. G.

THE EARTHQUAKE IN SPAIN

AN earthquake of wide extent and unusual violence took place on Christmas night in the southern provinces of Spain and in the neighbourhood of Madrid. The accompanying map may give some idea of its extent. As many of the towns and villages of Granada, Malaga, and Andalusia are unconnected with the capital by telegraph, the full extent of the damage is not yet known, but enough information has been received to mark the present as among the most destructive earthquakes of recent years. No precise observations as to time or direction have yet reached this country; and the officials at the Madrid Meteorological Observatory are reported to have made no observations at all, for there were no funds to purchase instruments for such a purpose. Madrid itself was within the disturbed area, but it was probably on its extreme north edge, for the effects of the shocks there were slight, and were confined to the rattling of windows, the ringing of bells, and the like. But in the three southern provinces the destruction was great and wide-

spread, involving in many cases considerable loss of life. There were several shocks, overthrowing whole villages and burying the inhabitants in the ruins. In Arenas del Rey 40 persons were killed, in Albuequeros 150, in Olivar 10, and in Cajar 12, and similar numbers in many of the towns and villages of the three provinces. The number of killed on the whole is put down in Madrid, from the reports of the local officials, at more than 1000. Even in large cities such as Granada, Malaga, Jaen, and Seville great damage was done, and much excitement prevailed. The inhabitants encamped in the open air through fear of fresh shocks. At Granada the front of the Cathedral was seriously injured, but the Alhambra was untouched. There is much discrepancy in the reports as to the duration of the earthquake: some village authorities have reported ten distinct shocks, while in other cases it is stated that there were seismic disturbances intermittently on the 26th, 27th, and 28th, the three days succeeding the great earthquake. This is especially reported from Jaen, where there should be ample means of corroborating the statement. At Cadiz a panic occurred in the theatre; in Malaga the Cervantes Theatre was much injured. It is noticeable that a sharp fall of the barometer was noticed all over the south of



Spain in the afternoon before the earthquake, and that there have since been frequent fluctuations. There is some doubt whether the number of persons who have lost their lives will not far exceed a thousand, inasmuch as the reports, as they grow more detailed, instead of diminishing, largely increase the original estimates. At Periana, in Malaga, a landslip on a mountain in the neighbourhood destroyed a church and 750 houses, from the ruins of which the dead and injured were being taken: similarly at Loja half the houses were overwhelmed. The town of Alhama in Andalusia is reported to have been completely destroyed, with 300 persons. A report is published with regard to Albuñuelas, stating that 900 persons are believed to have been killed under the houses thrown down by the earthquake. This would be about one-half the population of the town. At Antequera the shocks have left three churches in a dangerous condition, and the inhabitants are camping in the fields; the Cathedral at Seville, especially the Giralda tower, is much damaged; at Granada the richer classes are living in their carriages, which are stationed on the public promenade; the others camp out in the squares and open spaces; at Cordova the inhabitants are flying from the town. The loss in the town of Malaga is put down at 100,000, 227 buildings being injured. It would appear that five distinct shocks took place in this town on Christmas night, and three on the following morning. Five shocks on Friday and